

**REMARKS****Summary of the Office Action**

In the Office Action, claims 17-25 are withdrawn from further consideration as being drawn to a non-elected invention.

Claims 1-13 and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,426,991 to Mattson et al. (hereinafter "Mattson") in view of U.S. Patent No. 6,510,195 to Chappo (hereinafter "Chappo").

Claim 16 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Mattson in view of Chappo and further in view of U.S. Patent No. 6,372,558 to Yamanaka et al. (hereinafter "Yamanaka").

**Affirmation of Group I Election**

In the Office Action, claims 17-25 are withdrawn from further consideration as being drawn to a non-elected invention. Applicants hereby affirm their previous election by telephone in December of 2004 of Group I (claims 1-16), with regard to the election requirement discussed in the Office Action.

**Rejections under 35 U.S.C. § 103(a)**

Claims 1-13 and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Mattson in view of Chappo. Claim 16 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Mattson in view of Chappo and further in view of Yamanaka.

The Office Action alleges that, with respect to independent claim 1, Mattson "describes a back illuminated photodiode array comprising; a first conductive type semiconductor substrate having a light-incident surface." In particular, the Office Action cites to Fig. 7, reference number 64, Fig. 12, reference number 142, and the fourth line from the bottom of the Abstract of Mattson in this regard. Applicants respectfully traverse these interpretations of Mattson at least because the portions of Mattson cited by the Office Action bear no relationship to the specific features recited in independent claim 1, as will now be explained in more detail.

For example, the Office Action cites to Fig. 7, element 64 of Mattson in its rejection of claim 1. Applicants respectfully submit that that Fig. 7 of Mattson illustrates an optical detector bonded to a mounting board with bumps. See, for example, the "Brief Description of the Drawings" at col. 3 of Mattson. In Fig. 7, a back-illuminated photodiode 50 is directly bump bonded to a daughter board 64. See, for example, col. 6, lines 17-19 of Mattson. In other words, element 64, pointed out by the Office Action as meeting particular features of independent claim 1, is merely a daughter board. The detailed structure of the back-illuminated photodiode (BIP) 50 of Mattson has an array of back-illuminated photodiodes 24, as shown in Fig. 3 and described at col. 4, lines 52-64 of Mattson. However, Applicants respectfully submit that these teachings of Mattson do not meet the "first conductive type semiconductor substrate having a light-incident surface" features of independent claim 1.

Moreover, the Office Action cites to element 142 of Fig. 12 in this regard in its rejection of claim 1. Applicants respectfully submit that col. 7, lines 21-23 of Mattson teaches that a scintillation crystal and back-illuminated photodiode (BIP) array 140 is mounted on the edge of a PCB or ceramic substrate 142. Accordingly, element 142 of Mattson, pointed out by the Office

Action as meeting features of independent claim 1, is merely a ceramic substrate, not a back-illuminated photodiode (BIP) array, as asserted by the Office Action.

Even further, the Office Action cites to the fourth line from the bottom of the abstract of Mattson in its rejection of claim 1. This portion of the Abstract teaches "[t]his arrangement allows a plurality of paths (46) through the substrate (42, 64) supporting the photodiode to provide electrical connectivity (44) from the array to processing circuitry (66), reducing or eliminating the bottleneck of electrical leads from conventional arrays." Applicants respectfully submit that this teaching does not describe a back-illuminated photodiode (BIP) array. Accordingly, this portion of Mattson is also not relevant to the features of independent claim 1 in the manner applied by the Office Action.

At the third paragraph of page 5, the Office Action goes on to assert that Mattson "describes an opposite surface but does not specifically mention a plurality of recessed portions located opposite said light incident surface." Nonetheless, Applicants note that Mattson does not, to any extent, teach or suggest the use of recessed portions. For example, Applicants respectfully submit that the surface 34 in Mattson is flat.

The Office Action goes on to assert at the fourth paragraph of page 5 that Chappo "a patent from the same field [sic] of endeavor describes in 10, etc. #120 and col. 11 lines 4-8 describe an opposite surface with a plurality of recessed portions located opposite said light-incident surface to provide an electrical path from contacts on a back side of the photosensitive device through the substrate and the front and the back surfaces are aligned to each other."

Applicants respectfully traverse this interpretation of Chappo because element 120 in Fig. 10 of Chappo is not a photodiode, but is instead a peripheral edge of an application-specific

integrated circuit (ASIC) 258. Accordingly, element 120 is not a back-illuminated photodiode (BIP) array in the manner asserted by the Office Action. In this regard, col. 11, lines 4-8 of Chappo, a portion cited by the Office Action, teaches that "...recesses formed in a peripheral edge 120 so as to prevent electrical contact between ..." Applicants respectfully submit that the BIP array 52 shown in Fig. 10 of Chappo does not have recesses.

For at least the foregoing reasons, Applicants respectfully traverse the assertions made by the Office Action, including the assertions made at the fifth paragraph of page 5. Moreover, Applicants note that even though Chappo describes an X-ray detector having a scintillator, this teaching does not meet the features specifically recited in independent claim 1.

At the first paragraph of page 6, the Office Action asserts that the "remaining limitations of claim 1 are: a plurality of second conductive type semiconductor regions spatially detached at each bottom of said recessed portions; (Chappo col. 11 lines 5-8) wherein said semiconductor regions individually constitute pn junctions together with said semiconductor substrate. (Mattson figure 3, Chappo col. 8 line 50-55)." Applicants respectfully traverse these interpretations of Chappo because element 120 of Chappo is not a back-illuminated photodiode (BIP), but instead is an ASIC 258, as previously discussed.

Even further, Applicants respectfully submit that while Fig. 3 of Mattson illustrates pn junctions, the detailed structure of Mattson differs from that recited in independent claim 1, for example. In particular, independent claim 1 recites a feature of providing spatially detached regions that constitute pn junctions in a manner that is neither shown nor suggested by Mattson.

Moreover, Chappo merely states at col. 8, lines 50-55 that "[t]his charge is accumulated in the inherent photodiode junction capacitance 82. At the end of an accumulation period, e.g.,

having a duration of one video frame, all of the switches 88 for one matrix row are turned on through the relevant selection line 84." Applicants respectfully submit that this description does not meet the features recited in independent claim 1 in the manner asserted by the Office Action.

Accordingly, Applicants respectfully assert that the rejections under 35 U.S.C. § 103(a) should be withdrawn because neither Mattson nor Chappo, whether taken singly or combined, teach or suggest each feature of independent claim 1, as amended. MPEP § 2143.03 instructs that "[t]o establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 409 F.2d 981, 180 USPQ 580 (CCPA 1974)." Furthermore, Applicants respectfully assert that dependent claims 2-16 are allowable at least because of their dependence from claim 1 and the reasons set forth above. Moreover, Applicants respectfully submit that the additionally applied reference to Yamanaka, with respect to claim 16, does not cure the deficiencies discussed above with regard to Mattson and Chappo.

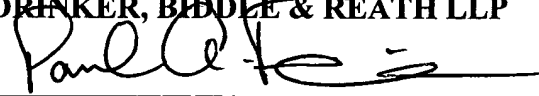
### **CONCLUSION**

In view of the foregoing, Applicants respectfully request reconsideration and the timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution.

If there are any other fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-0573. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

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